

ANNUAL REPORT

OF

THE CURATOR

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

1907-1908.

CAMBRIDGE, U. S. A.:

PRINTED FOR THE MUSEUM.

1908.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EAST-ERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U.S.N., COMMANDING, PUBLISHED OR IN PREPARATION:—

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| A. AGASSIZ. V. ⁵ General Report on the Expedition. | H. LUDWIG. The Holothurians. |
| A. AGASSIZ. I. ¹ Three Letters to Geo. M. Bowers, U. S. Fish Com. | H. LUDWIG. The Starfishes. |
| A. AGASSIZ and H. L. CLARK. The Echini. | H. LUDWIG. The Ophiurans. |
| F. E. BEDDARD. The Earthworms. | G. W. MÜLLER. The Ostracods. |
| H. B. BIGELOW. The Medusae. | JOHN MURRAY. The Bottom Specimens. |
| R. P. BIGELOW. The Stomatopods. | MARY J. RUTHBUN. X. ¹⁰ The Crustacea Decapoda. |
| O. CARLGREN. The Actinaria. | HARRIET RICHARDSON. II. ² The Isopods. |
| S. F. CLARKE. VIII. ⁸ The Hydroids. | W. E. RITTER. IV. ⁴ The Tunicates. |
| W. R. COE. The Nemerteans. | ALICE ROBERTSON. The Bryozoa. |
| L. J. COLE. The Pycnogonida. | B. L. ROBINSON. The Plants. |
| W. H. DALL. XIV. ¹⁴ The Mollusks. | G. O. SARS. The Copepods. |
| C. R. EASTMAN. VII. ⁷ The Sharks' Teeth. | F. E. SCHULZE. XI. ¹¹ The Xenophyophoras. |
| B. W. EVERMANN. The Fishes. | H. R. SIMROTH. The Pteropods and Heteropods. |
| W. G. FARLOW. The Algae. | E. C. STARKS. XIII. ¹³ Atelaxia. |
| S. GARMAN. XII. ¹² The Reptiles. | TH. STUDER. The Alcyonaria. |
| H. J. HANSEN. The Cirripeds. | JH. THIELE. XV. ¹⁵ Bathysciadium. |
| H. J. HANSEN. The Schizopods. | T. W. VAUGHAN. VI. ⁶ The Corals. |
| S. HENSHAW. The Insects. | R. WOLTERECK. The Amphipods. |
| W. E. HOYLE. The Cephalopods. | W. McM. WOODWORTH. The Annelids. |
| C. A. KOFOID. III. ³ IX. ⁹ The Protozoa. | |
| P. KRUMBACH. The Sagittae. | |
| R. VON LENDENFELD and F. URBAN. The Siliceous Sponges. | |

¹ Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.

² Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.

³ Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.

⁴ Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.

⁵ Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.

⁶ Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.

⁷ Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.

⁸ Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.

⁹ Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.

¹⁰ Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.

¹¹ Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.

¹² Bull. M. C. Z., Vol. LII., No. 1, June, 1908, 14 pp., 1 pl.

¹³ Bull. M. C. Z., Vol. LII., No. 2, July, 1908, 8 pp., 5 pls.

¹⁴ Bull. M. C. Z., Vol. XLIII., No. 6, October, 1908, 285 pp., 22 pls.

¹⁵ Bull. M. C. Z., Vol. LII., No. 5, October, 1908, 11 pp., 2 pls.

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AT HARVARD COLLEGE

TO THE

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FOR

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LIBRARY
MUS. COMP. ZOÖLOG
CAMBRIDGE, MASS

CAMBRIDGE, U. S. A.:

PRINTED FOR THE MUSEUM.

1908.

MUSEUM OF COMPARATIVE ZOÖLOGY.

Faculty.

CHARLES W. ELIOT, *President.*

HENRY P. WALCOTT.

GEORGE L. GOODALE.

SAMUEL HENSHAW, *Curator.*

ALEXANDER AGASSIZ, *Secretary.*

Committee on the Museum.

HENRY P. WALCOTT.

GEORGE L. GOODALE.

Officers.

SAMUEL HENSHAW *Curator.*

WALTER FAXON *Assistant in Charge of Crustacea and Mollusca.*

SAMUEL GARMAN *Assistant in Herpetology and Ichthyology*

WILLIAM BREWSTER *Assistant in Charge of Birds.*

W. McM. WOODWORTH *Assistant in Charge of Worms.*

CHARLES R. EASTMAN *Assistant in Vertebrate Palaeontology.*

OUTRAM BANGS *Assistant in Charge of Mammals.*

HUBERT L. CLARK *Assistant in Invertebrate Zoölogy.*

HENRY B. BIGELOW *Assistant in Invertebrate Zoölogy.*

ROBERT W. SAYLES *Assistant in Charge of the Geological (Exhibition) Collections.*

FRANCES M. SLACK *Librarian Emerita.*

MAGNUS WESTERGREN *Artist.*

GEORGE NELSON *Preparator.*

WILLIAM M. DAVIS *Sturgis-Hooper Professor of Geology.*

EDWARD L. MARK *Hersey Professor of Anatomy.*

GEORGE H. PARKER *Professor of Zoölogy.*

WILLIAM E. CASTLE *Professor of Zoölogy.*

WILLIAM M. WHEELER *Professor of Economic Entomology.*

ROBERT T. JACKSON *Assistant Professor of Palaeontology.*

ROBERT DE C. WARD *Assistant Professor of Climatology.*

JAY B. WOODWORTH *Assistant Professor of Geology.*

DOUGLAS W. JOHNSON *Assistant Professor of Physiography.*

Instructors and Assistants in the Laboratories of Zoölogy and Geology.

HERBERT W. RAND *Instructor in Zoölogy.*

GEORGE R. MANSFIELD *Instructor in Geology.*

PAUL HAYHURST *Instructor in Economic Entomology.*

E. D. CONGDON *Austin Teaching Fellow in Zoölogy.*

JOHN DETLEFSEN *Austin Teaching Fellow in Zoölogy.*

G. T. HARGITT *Assistant in Zoölogy.*

W. P. HAYNES *Assistant in Geology.*

F. H. LAHEE *Assistant in Geology.*

B. M. VARNEY *Assistant in Meteorology.*

J. E. HYDE *Assistant in Physiography.*

W. G. REED, JR. *Assistant in Physiography.*



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SOLENODON PARADOXUS

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

Thirteen courses in Zoölogy were given during the Academic year 1907-1908 by Professors Mark, Parker, Castle, Jackson, and Dr. Rand to two hundred and twenty-four students in Harvard University, and nine courses were given to thirty-nine students of Radcliffe College. Messrs. Thomas Barbour, E. D. Congdon, E. C. Day, G. F. Hargitt, F. H. Lahee, R. C. Mullenix, C. S. Palmer, and A. S. Pearse assisted in the University courses and Messrs. Manton Copeland, W. B. Herms, and J. A. Long in the courses in Radcliffe College.

The Virginia Barret Gibbs Scholarship was held by Mr. G. F. Hargitt. Two students, working at Woods Hole and at the Bermuda Biological Station for Research, received aid from the Humboldt Fund.

In the Department of Geology and Geography, the instruction was given by Professors Jackson, Ward, Woodworth, Johnson, and Dr. Mansfield, assisted by Messrs. Augustus Cobb, J. W. Eggleston, F. H. Lahee, and B. M. Varney. Nineteen courses were taken by three hundred and sixty-nine students of Harvard University and three courses were taken by twelve students of Radcliffe College.

The income derived from the Josiah Dwight Whitney Scholarship Fund was shared by Messrs. Sedgwick Smith, G. B. Roorbach, and W. G. Reed, Jr.

For an addition to its invested funds, the Museum is indebted to the generosity of Miss Maria Whitney who has given the sum of \$5000.—, the income of which can be applied to the care (binding) and increase of the Whitney Library. It will be recalled that the Whitney Library contains a large and serviceable series of geological works brought together in great part by Miss Whitney's brother, Josiah Dwight Whitney, Sturgis-Hooper Professor of Geology from 1875 to 1896. The Whitney Library is rich in

serials, in the publications of governmental surveys, and in the writings of the early masters of geology. The Maria Whitney Fund assures an annual increase to this valuable series of books.

Miss Mary Dandridge Peck has given the Museum some most interesting memorials (original letters and drawings, together with a large crayon likeness) of her grandfather, William Dandridge Peck, America's first scientific entomologist, and Harvard's first Professor of Natural History (1805-1822).

From Dr. P. R. Uhler, the Museum has received the Meyer Dür series of European Hemiptera. This collection contains a very large number of species determined by Dr. Franz Fieber, and has been studied critically by Dr. Uhler himself. Dr. Uhler's gift is an important one and emphasizes a most precious asset of the Museum, namely, the constancy with which the assistants and students of the Museum's Founder contribute valuable research material to its stores.

Another gift of great scientific value has been received from Dr. George W. Peckham and Mrs. Elizabeth G. Peckham; it consists of a considerable number of Attidae (Jumping spiders), including the types of most of the species described by the Peckhams, the acknowledged authorities on this group of animals.

Miss Elizabeth B. Bryant has most kindly given her large series of spiders, principally from New England and New York; this series is fully identified and most carefully labeled. The Menge, Keyserling, Emerton, Peckham, and Bryant collections of spiders constitute a series of specimens that cannot be overlooked by future students.

Among the many collections most generously given the Museum by Mr. John E. Thayer, especial mention should be made of the series of mammals from Lower California and the first installment of mammals from central and western China.

Mr. Thomas Barbour's collections from India, Burmah, the Dutch East Indies, and New Guinea have enriched the Museum's study series of specimens in every Department, and to his generous interest the Museum is indebted for many other desirable additions. Among the more notable of these, mention may be made of a valuable series of skins of Birds of Paradise and of a number of magnificent specimens of the great bird-winged butterflies (*Ornithoptera* spp.).

Another series of Icelandic birds due to the kind initiative of Messrs. J. W. Hastings and L. J. de G. de Milhau has been received. These birds, mounted by Rowland Ward, are excellent examples of modern taxidermy, and make a most interesting exhibition of the avifauna of an ancient continental island. It is with sincere regret that the death of Mr. Hastings in New York on April 26th, 1908, is recorded. Mr. de Milhau writes that he will continue the collection as heretofore in the joint names of Mr. Hastings and himself.

Dr. William Lord Smith has sent to the Museum a number of mammalian heads and horns; many of these will be utilized for exhibition. From Dr. Smith the Museum has also received a fine male Woodland Caribou (*Rangifer caribou*) which Mr. Nelson has mounted for the North American collection. Mr. Nelson has mounted most effectively a Grant's Caribou (*Rangifer granti*) from Alaska, a gift of Mr. Francis T. Colby, to whom the Museum is indebted furthermore for a crocodile from Ceylon and for some specimens (skulls and skins) of three species of Alaskan bears.

The New York Zoölogical Society, through its Director, Dr. W. T. Hornaday and its Curator of Reptiles, Mr. R. L. Ditmars, has continued to place the Museum under deep obligations by its gifts; from them we have received a specimen of the remarkable African tortoise, *Cinyxis erosa* and two large monitors, *Varanus salvator* (with skeleton) from Ceylon, and *V. niloticus* from Angola, West Africa, all prepared for exhibition by Mr. Nelson.

The Museum is also indebted to Dr. R. T. Jackson for some rare and interesting fossils, to Professors W. E. Castle and C. B. Davenport and to Mr. Arthur Perrin for specimens for the collection of animals under domestication, and to Mr. Charles Bullard for a collection of fresh-water sponges.

The extensive series of bones of the Great Auk, obtained last year from Mr. William Barbour's gift for present use, have been sorted over in part, and several complete skeletons have been mounted most successfully by Mr. Michael Reitz. It is hoped that these skeletons can be exchanged with other Museums.

From the American Museum of Natural History the Museum has received, in exchange, a series of Hawaiian corals named by Dr. T. Wayland Vaughan.

A fine example of Weddell's Seal, captured during the stay of the

"Scotia" (Scottish National Antarctic Expedition, William S. Bruce, Leader), in the Antarctic regions, has been purchased for the Pacific Room; by purchase, the Museum has also acquired some hydroids specially prepared for exhibition and a series of fossils from the Carboniferous of Belgium.

Owing to illness, Prof. K. Mitsukuri has been obliged to relinquish the preparation of a report on the holothurians collected during the "Albatross" expedition to the Tropical Pacific. The collection has been returned to the Museum.

Exploration, one of the most legitimate functions of a University Museum, has been fostered, to the great advantage of science and of this Museum, by the scientific zeal and disinterestedness of the present Director of the University Museum, since the foundation of the Museum of Comparative Zoölogy, and two modest attempts in continuance of this policy have been undertaken during the present year by the Museum.

Mr. George Nelson, of the Museum staff, visited Santo Domingo early in 1908 in search of the Agouta, *Solenodon paradoxus*, an insectivorous mammal known to science since 1832, and represented in the museums of but two institutions, by four specimens, all more or less imperfect. Mr. Nelson's efforts were most successful, for the Museum has secured an excellent series of this rare mammal, a series sufficient it is hoped to warrant a comprehensive memoir on the habits, structure, and affinities of the Solenodontidae.

On the plate accompanying this Report, four living Agoutas are shown (Figure 1), and also an adult female (Figure 2), and a young male (Figure 3), all from photographs taken in Cambridge by Mr. Nelson.

In July, Dr. H. B. Bigelow made a short trip in the U. S. F. C. Schooner "Grampus" to the Gulf Stream. Dr. Bigelow's objects were 1st, to study the fauna at intermediate depths, 2d, to compare the surface fauna of the warm waters of the Gulf Stream with those of the cold current, 3d, to test the efficacy of the Monaco Deep-sea trap and lastly to collect and preserve material.

From Martha's Vineyard the "Grampus" ran about 200 miles S.S.E., then 140 miles N.W., and finally about 150 miles N.E. Though the collections obtained were not large, some interesting material was preserved, and the other objects of the Expedition

were successfully carried out. A report on the scientific results will be published later. Dr. Bigelow's co-operation enabled the Museum to undertake this work, and we have to thank the Hon. G. M. Bowers, U. S. Commissioner of Fisheries, for placing the "Grampus" at Dr. Bigelow's disposal, and also Dr. L. J. Cole, who served as Assistant on the trip.

Owing to the smallness of its staff, the Museum engages, from time to time, Assistants for the care and arrangement of its study series of specimens.

During the year, Miss E. B. Bryant was employed for two months, and under Dr. Faxon's supervision arranged, catalogued, and labeled a considerable number of land shells.

Mr. A. P. Morse was engaged for one month, and worked over, more or less critically, the Museum's collections, including the S. H. Scudder series, of Forficulidae (earwigs) and Blattidae (roaches).

Dr. G. M. Allen's services were secured for three days each week for nine months and were given chiefly to the mammalian osteological collection. All the skeletal parts of the orders Primates, Chiroptera, Insectivora, Carnivora, and Rodentia have been identified, catalogued, labeled, and arranged by Dr. Allen, who has also studied critically the entire series of the Chiroptera. Notes on some of the more interesting forms, with descriptions of five new ones, have been published (Bull. M. C. Z., vol. 52, no. 3) as a result of Dr. Allen's work.

The Museum is indebted to Messrs. Faxon, Brewster, Woodworth, Bangs, and Bigelow for their interest in the collections entrusted to their care, and also to Mr. R. W. Sayles, who makes his first Report as Assistant in charge of the Geological Collections open to the Public.

Of the more important additions to the collections on exhibition made during the year, mention may be made of the four massive corals from the Great Barrier Reef of Australia, which are shown in a new floor case next the Bora Bora model in the room devoted to the systematic collection of polyps. These specimens are a part of the fine series made some years ago by the late Prof. H. A. Ward and given to the Museum by Mr. Agassiz. It is proposed to exhibit other specimens of Australian reef-building corals from this same source, in the adjacent wall case.

Several North American mammals have been added to the collection on exhibition, as a result of Dr. H. B. Bigelow's zeal and Mr. Nelson's skilful taxidermy. A number of heads and horns of some typical forms of hoofed Mammalia have been mounted by Mr. Nelson and are hung on the walls of the entrance Hallway.

Through the kind interest of Professors J. B. Woodworth and C. H. Hitchcock the Museum has obtained a large slab of Potsdam sandstone, showing the tracks of the enigmatical animal known as *Climatichtnites wilsoni*. The slab is from Mooers, N. Y., and is installed in the entrance Hallway.

New cases have been built in the Hallway, in the Pacific Room, in the Coral Room, and in the rooms devoted to the Systematic collections of mammals and of fishes.

A rearrangement of the Systematic collection of fishes on exhibition has been begun; for the Synoptic collection of fishes the rearrangement is completed. The arrangement of the collections in the room devoted to the Pacific Fauna has been changed; the vertebrates are displayed in the wall cases, the invertebrates in one of the floor cases, and in the second floor case are brought together characteristic vertebrates and invertebrates peculiar to the islands of the Pacific.

The Library consists of 44,558 volumes, and 40,266 pamphlets; 1,040 volumes, and 2,240 pamphlets have been added during the year.

Two numbers of the Memoirs, fifteen numbers of the Bulletin and the Annual Report, a total of 578 (78 quarto, 500 octavo) pages, with 59 (15 quarto and 44 octavo) plates have been issued and are listed on pages 41-42. The two Memoirs and three of the Bulletins contain reports on the scientific results of explorations carried on under Mr. Agassiz's direction, one Bulletin contains a report upon the "Albatross" Echini collected in 1906, one Bulletin is a Contribution from the Zoölogical Laboratory, three Bulletins are Contributions from the Geological Laboratory, and seven Bulletins are reports upon various Museum collections.

The Corporation has continued its appropriation of \$350.—to further the publication of Contributions from the Zoölogical and Geological Laboratories.

SAMUEL HENSHAW.

REPORT ON THE ZOÖLOGICAL LABORATORY.

BY E. L. MARK.

During the Academic year 1907-08 the following changes have taken place in the Department of Zoölogy. Assistant Professor Castle has been promoted to a full professorship. A professorship of Economic Entomology has been established and the chair has been filled by the appointment of Dr. William Morton Wheeler. By the assignment of an additional Austin Teaching Fellow to the Department it has been possible so to arrange the work that Dr. Rand will have more time for research and the opportunity to offer an advanced course in a subject in which he is especially interested—"Morphogenesis. The Dynamics of Development and Growth." An Instructor in Entomology is also to be added to the staff. The great advantage secured by these changes and additions is the increased amount of time which will be given to original investigations, especially by Professors Wheeler and Castle.

As in previous reports, the first of the accompanying tables exhibits the number of students attending each of the courses in Zoölogy offered during the year. The numbers printed in italics refer to students in the Lawrence Scientific School and in the Graduate School of Applied Science. The second table gives corresponding information relative to Radcliffe College.

TABLE I.

Courses 1907-08	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Bussey	Total
Zoölogy 1	4	5	13	19	42	8		91
" 2	2	2	8	11	6	3		32
" 3	5	6	4	3		1		19
" 4	4 + 1	2	2	2		1		12
" 6	5 + 1	1	2			1		10
" 9a	5							5
" 11a	1		2	3				6
" 11b	2	1 + 1	2	4				10
" 11a & 11b lect.	5 + 1	1		2			1	10
" 13	8	1						9
" 15	9							9
" 20a	7							7
" 20c	3							3
" 20e	1							1
Sums	61 + 3	19 + 1	33	44	48	14	1	224

TABLE II.

Courses 1907-08	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Total
Zoölogy 1		3	6	2	7	2	20
" 2			1		1	1	3
" 3	1	1		2			4
" 4	2			1			3
" 6	2						2
" 9a	1						1
" 11a & 11b lect.	1						1
" 15	2			1			3
" 20	2						2
Sums	11	4	7	6	8	3	39

Except for changes due to the alternation of courses in successive years, there was no difference between the courses offered during this and the preceding year. Assistant Professor Castle's courses 11a and 11b were, however, transferred from the group "Primarily for Graduates" to the middle group "For Graduates and Undergraduates," thus restoring them to the place they had previously held. The research courses were more specifically described than in previous years, each instructor naming the subjects in which he was willing to receive research students.

Instruction in the individual courses was not materially altered from that given in 1905-06, except for the usual changes necessitated by the development of the subject.

Zoölogy 1 was conducted by Professor Parker, who had as chief assistant Mr. A. S. Pearse, and as sub-assistants Messrs. E. C. Day, R. C. Mullenix and C. S. Palmer. In the corresponding course in Radcliffe College the laboratory assistant was Mr. W. B. Herms.

Zoölogy 2 was given, as for some years past, by Assistant Professor Castle. The chief assistant in the course was Mr. E. D. Congdon. Mr. E. C. Day also assisted six hours a week. The assistant in this course in Radcliffe was Mr. J. A. Long.

The lectures in Zoölogy 3 were attended by three students not enrolled in the course. The chief assistant to Dr. Rand in this course was Mr. G. T. Hargitt. Mr. Thomas Barbour also assisted three hours a week. The assistant in the Radcliffe course was Mr. Manton Copeland. The similarity of a part of the laboratory

work in this course and in Hygiene 1 suggests the desirability of correlation between the two courses with a view to avoiding repetition on the part of students who take both courses. Several anatomical preparations, made with the help of Mr. M. Reitz, were added to the laboratory collection.

The enrollment in Zoölogy 4 was rather larger than usual, and the lectures were attended by two students not enrolled. The course was conducted as in previous years, the laboratory work being in charge of Dr. Rand.

In the lectures in Zoölogy 6 most attention was given to the development of the central nervous system. The laboratory was in charge of Dr. Rand, who succeeded in covering thoroughly more ground than during the first year in which the course was given. Three graduate students not enrolled attended the lectures.

Zoölogy 9a was given by Assistant Professor Jackson to five Graduate students. Mr. F. H. Lahee assisted in the laboratory work. By special permission one graduate student in Radcliffe College was allowed to take the course.

Students were allowed to take the lectures without the laboratory work in Assistant Professor Castle's courses Zoölogy 11a and 11b, the two half-courses together counting under this arrangement as a half-course. As shown in Table I, ten students availed themselves of this privilege. Likewise one student in Radcliffe College was allowed to attend the lectures under the same conditions. The laboratory work in these two half courses consisted largely in breeding experiments with small mammals, and certain of the results will be incorporated in future publications.

Zoölogy 13 was given by Professor Parker on the same general lines as in 1905-06. The lectures were attended by two graduates who were not enrolled. Professor Parker also gave, as in former years, Zoölogy 15. The lectures were attended by three students who were not enrolled and did no laboratory work. The course was also repeated for three Radcliffe students. Of the laboratory topics assigned three furnished results that are to be prepared for publication. One Harvard student had as laboratory topic in this course the same subject that he was at work upon in Zoölogy 20c under Professor Parker.

Eleven graduate students were engaged in research, seven under direction of Professor Mark (Zoölogy 20a), three under Professor

Parker (Zoölogy 20c), and one under Dr. Rand (Zoölogy 20e). Two of those enrolled in course 20a presented theses which were accepted, passed the examinations, and received at Commencement in June the degree of Ph.D. The thesis of Manton Copeland was on "*Spermatogenesis in Apis and Vespa*," that of J. A. Long was on "*The maturation of the egg of the mouse*." Of those enrolled in 20c one presented a thesis which was accepted, and the two others presented theses, passed the examinations and received in June the degree of Ph.D. The thesis of R. C. Mullenix was on "*The peripheral terminations of the eighth cranial nerve in vertebrates, especially in fishes*," that of A. S. Pearse was on "*The reactions of amphibians to light*."

All other students in research courses made satisfactory progress with their work.

During the summer of 1908 two students received aid to the extent of \$140.— from the Humboldt Fund while working at the Bermuda Station, and two received aid, \$35.—, while working at Woods Hole.

The Bermuda Biological Station for Research was open from June 18 till August 5 inclusive. For two weeks Dr. Rand was in charge; for the remainder of the time, Professor Mark. Seven persons were enrolled and some of the results of studies carried on are already in press; others will appear later in connection with work done in the laboratory in Cambridge.

There has been installed in the basement a motor generator, which is actuated by the 500-volt direct current already introduced into the aquarium room, and furnishes a direct current of about 100 volts suitable for experimental work in which the alternating current could not be employed, and for running projection lanterns already ordered to be installed the coming year.

Professor Mark received grants from the Carnegie Institution of Washington to the amount of \$400.— to aid in investigations already begun.

The Zoölogical Club held twenty-eight meetings on the afternoons of Fridays with an average attendance of twenty-two. At these meetings twenty-five original papers were presented and a number of others were reviewed. The subjects to be presented or discussed were usually announced in the *University Gazette*.

PUBLICATIONS. AUGUST 1, 1907—JULY 31, 1908.

Contributions from the Zoölogical Laboratory.

191. BARROWS, W. M.—The reactions of the pomace fly, *Drosophila ampelophila* Loew, to odorous substances. *Journ. exp. zool.*, October, 1907, vol. 4, p. 515–537.
192. CONGDON, E. D.—The effect of temperature on the migration of the retinal pigment in decapod crustaceans. *Journ. exp. zool.*, October, 1907, vol. 4, p. 539–548.
193. WALTER, H. E.—The reactions of planarians to light. *Journ. exp. zool.*, November–December, 1907, vol. 5, p. 35–162.
194. BIGELOW, H. B.—Studies on the nuclear cycle of *Gonionemus murbachii* A. G. Mayer. *Bull. M. C. Z.*, December, 1907, vol. 48, p. 285–400, 8 pls.
195. PARKER, G. H.—The sensory reactions of *Amphioxus*. *Proc. Amer. acad. arts and sci.*, April, 1908, vol. 43, p. 413–455.

Contributions from the Bermuda Biological Station for Research.

11. LINTON, E.—Notes on parasites of Bermuda fishes. *Proc. U. S. nat. mus.*, October, 1907, vol. 33, p. 85–126, pls. 1–15.
12. PARKER, G. H.—The sensory reactions of *Amphioxus*. *Proc. Amer. acad. arts and sci.*, April, 1908, vol. 43, p. 413–455.

Other Publications.

CASTLE, W. E.—The production and fixation of new breeds. *Amer. breeders' assoc. Rept.*, 1907, vol. 3, p. 34–41.

Color varieties of the rabbit and of other rodents; their origin and inheritance. *Science*, 30 August, 1907, new ser., vol. 26, p. 287–291.

REPORT OF THE STURGIS-HOOPER PROFESSOR OF GEOLOGY.

BY WILLIAM M. DAVIS.

In September and early October, 1907, I attended the centenary celebration of the Geological Society of London, and before and after the meeting made excursions in North Wales and the English Lake district, in both of which the effects of glacial erosion were prominently displayed. Regarding these features in North Wales, I made a preliminary report at the New York meeting of the National Academy in November, and spent much time through the winter in preparing a detailed discussion of the various theories that had been offered to account for them.

As I was excused from most of the work of lecturing during the year, my time was given chiefly to writing on three subjects. First, an account of the physical geography of the United States for the forthcoming edition of the Encyclopaedia Britannica. Second, a similar essay, but with greater attention to human conditions, on North America, exclusive of Mexico, for a work entitled: "Die Kultur der Gegenwart," now in course of publication. Third, a handbook for laboratory work in schools, entitled "Practical exercises in physical geography," the preparation of which has occupied a share of time for four years past, and is now completed. The object of this book is to indicate a series of exercises for laboratory work that shall be more disciplinary than those now commonly employed, if one may judge of present methods by the laboratory note-books handed in at the time of examination by candidates for admission to Harvard College.

At the winter meeting of the Association of American Geographers in Chicago, and at the second annual gathering of geography teachers in and near Boston, held in the Museum, March 28th, I presented for discussion a plan for the systematic description of land forms, under the title of "The method of structure, process and stage," which has been gradually developed in the progress

of my work for a number of years past. The same method was applied during a geographical excursion across northern Italy and into southeastern France from June 1st to July 18th, when I had the advantage of discussing its application to various problems with some fifteen European and American geographers who accompanied me for longer or shorter periods. We visited in succession the dissected coastal plain in the neighborhood of Ancona, the re-deepened valley of the Lamone near Faenza, the basins of Florence and Val d'Arno, the simple shore-line near Pisa, the complicated shore-line between Spezia and Genoa, the elbow of capture of the Tanaro at Bra, the over-deepened Alpine valleys in whose terminal depressions lie the superb lakes of Como and Maggiore, the great terminal moraines of Ivrea, the valley of Aosta, various parts of the valley system of the Isère, the dissected slope of the Cévennes, and the volcanic district of Le Puy.

Following this excursion I attended the International Geographical Congress at Geneva, and served there as President of the section on Educational Geography.

PUBLICATIONS. AUGUST 1, 1907—JULY 31, 1908.

Practical exercises in physical geography. Boston. [June, 1908.] 148 pp.

Atlas for practical exercises in physical geography. Boston. [July, 1908.] 45 plates.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

BY ROBERT DEC. WARD.

The following table presents, in a condensed form, a summary of the courses offered by this Department during the year 1907-1908, and also gives the numbers, and the classification, of the students who were enrolled in each course.

Courses	Harvard College Reg. Sp.	L. S. S.	Bussey.	Radcliffe.†	Graduate School.‡	Total.
Elementary						
A ¹	32 + 10 = 42	1	3	(4)	2 + 0 = 2	48
B ²	49 + 9 = 58	0	4	(4)	1 + 0 = 1	63
C ²	34 + 3 = 37	1	2		2 + 0 = 2	42
1 ¹	3 + 0 = 3	2	0		0 + 0 = 0	5
2 ¹	1 + 0 = 1				0 +	1
4 ¹	65 + 9 = 74	10	5	(4)	2 + 4 = 6	95
5 ²	29 + 7 = 36	3	1		3 + 0 = 3	43
	213 + 38 = 251	+ 17	+ 15		10 + 4 = 14	297
Advanced						
8 ¹	9 + 1 = 10	0	0		2 + 0 = 2	12
10*	16 + 4 = 20	2	0		1 + 2 = 3	25
11	2 + 0 = 2	1	0		2 + 0 = 2	5
12	0 + 0 = 0	1	0		1 + 0 = 1	2
15	0 + 0 = 0	1	0		1 + 0 = 1	2
16 ²	9 + 2 = 11	0	0		0 + 0 = 0	11
19 ¹ .	1 + 0 = 1	0	0		2 + 0 = 2	3
	37 + 7 = 44	+ 5	+ 0		9 + 2 = 11	60
Graduate						
20a	2 + 0 = 2	0	0		1 + 0 = 1	3
20b*	0 + 0 = 0	0	0		1 + 0 = 1	1
20c	0 + 0 = 0	0	0		3 + 0 = 3	3
20d	0 + 0 = 0	0	0		1 + 0 = 1	1
20e	1 + 0 = 1	0	0		3 + 0 = 3	4
	3 + 0 = 3	+ 0	+ 0		9 + 0 = 9	12
	253 + 45 = 298	+ 22	+ 15	(12)	28 + 6 = 34	

* Given in the Rotch building.

† Separate classes, not counted in totals.

‡ The first column refers to Arts and Sciences, the second to Applied Science.

To the numbers given in this table should be added six students who were enrolled in Mining 28 1 hf., a course given in the Geological Museum. It may here be noted that Geology 10 (The origin and geological relations of ore-deposits), given by Professor H. L. Smyth, has, by vote of the Division of Geology, now been turned over to the Division of Mining, and that the course in Economic Geology (Geology 18), from which Professor Smyth has withdrawn, has been somewhat rearranged, and will hereafter be given in the Department of Geology and Geography by Professors Wolff, Woodworth, and Palache. Further details regarding the courses of instruction will be found in the accompanying reports of the Departmental staff. Messrs. Augustus Cobb, J. W. Eggleston, F. H. Lahee, and B. M. Varney were assistants in the Department.

Owing to the small attendance upon the summer courses in geology and geography offered in Cambridge during several years past, the Department this year devoted its available resources to the development of courses given away from Cambridge. Professor Davis offered an extended course of physiographic field work in northern Italy and southern Switzerland, as did also Professor Johnson in Central France. Professor Wolff offered a course in southern Montana, and Dr. Mansfield gave, in Montana, a course equivalent to Geology 5 of the winter term. Under special conditions, one student, acting as assistant, was admitted to the Shaler Memorial Expedition to South America, with the privilege of counting completed field studies in Brazil as a half-course.

The two events of most importance in the activities of the Department during the year were (1) the installation of the seismograph, and (2) the sending of the Shaler Memorial Expedition to South America.

The Bosch-Omori 100 kilo. seismograph or "tromometer," referred to in last year's Report, arrived in Cambridge at the end of 1907, but owing to numerous delays was not completely installed and in operation until April 8, 1908. The instrument is mounted on an L-shaped concrete pier whose base, which is as deep as the foundation of the walls of the geological section of the Museum, *i. e.*, about 3 feet, rests on undisturbed stratified sand of glacial origin overlying clay of unknown depth. While the depth is not known, it probably equals, if it does not exceed, 50 feet, since a boring at the north side of the Museum encountered no rock at

60 feet, and since the "Cambridge shales" are met with in front of Memorial Hall at about 12 feet below the surface. The two arms or components of the tromometer stand N. 3° E. and N. 93° E. respectively, according to a determination of the meridian passing through the station. The latitude and longitude of the station determined by comparison with the position of the Astronomical Laboratory, are as follows:—Lat. $42^{\circ} 22' 36''$ N., Long. $71^{\circ} 06' 59''$ W. from Greenwich. The altitude of the pendulums as compared with the local contour of the city engineer's map is provisionally determined as 7 meters above mean sea-level. A brief account of the station has been published in *The Harvard Bulletin* for April 29, 1908.

At present the pendulums are working without a damping device. The latter has, however, been ordered from the manufacturers. The first distinct earthquake record was obtained on the morning of May 15, 1908, at 3h. 39m. 43s. as indicated by the north-south component. The east-west component did not record the trembling until 3h. 47m. 5s. The time of maximum motion was 3h. 45m. 35s.; and the end of the record came at 4h. 19m. 15s. The arrangements for obtaining exact time are as yet unsatisfactory. The recording of the beginning of the preliminary tremors at this station in the above-mentioned earthquake at a time somewhat earlier than was noted in Washington may be due to the greater sensitiveness of our instrument. Some trouble has been experienced in the rusting of important wires which support the pendulum. It is hoped soon to obviate this difficulty. The chief expense in the maintenance of the tromometer is likely to be the cost of the fixative solution for the smoked paper, and of the paper used for the records. In ordinary practice a skilful manipulator can change the records, fix the smoked paper, and adjust the pendulums in half an hour. This work is done between 8 and 9 A. M. Mr. G. M. Flint is doing the work with care and promptness. To avoid the possible wrecking of the booms of the steady masses, should the suspending wires break, a block has been placed under each weight with less than a quarter of an inch windage, which allows a free swing of the pendulum and serves also as a support on which to lower the pendulum when it is necessary to dismantle it.

Arrangements have been made with Professor H. F. Reid, of

Baltimore, Md., the American representative of the International Seismological Bureau, to report through him to that organization, but it is intended also to present for publication in the Bulletin of the Museum the results of earthquake study made at the station. The catalogues and special reports of the International Seismological Bureau have been received at the Geological Laboratory, and are at present placed in room 24 for reference. Professor Woodworth superintended the installation of the seismograph, and has charge of the instrument. During his absence in South America, Dr. G. R. Mansfield is temporarily in charge.

Mention was made in last year's Report of the Shaler Memorial Fund, and of the probable use of the income from that Fund in paying the expenses of an expedition to South America. During the past year the Division of Geology, entrusted with the management of the Fund, voted to send Professor J. B. Woodworth to South America. For this purpose he was granted leave of absence from June 20 to the end of the first half-year, 1908-1909. During the summer he made a study of the Permo-Carboniferous conglomerates of southern Brazil. After the rainy season sets in in Brazil, Professor Woodworth will spend the remainder of his time upon the coast of Chile, between Valdivia and Valparaíso, in an investigation of the nature of shore-line changes. Professor R. DeC. Ward and Mr. Winthrop Perrin Haynes were appointed members of the Expedition to Brazil for the term of the summer vacation.

The Geological Conference was maintained during the year, papers on a wide range of subjects being presented by instructors and students.

The officers of the Department have been greatly helped in their work of preparing specimens and diagrams for their lectures and laboratory work by the effective aid given by Mr. George M. Flint, whose engagement as laboratory assistant and curator of teaching materials was noted in last year's Report.

The sub-committee on the Gardner collection of photographs (Messrs. Woodworth, Ward, and Johnson) submit the following tabulated report. Mr. Flint has begun a geographic distribution catalogue of the slides, work on which is in progress. Numerous photographs have been temporarily deposited in the exhibition cases of the Geological Museum. It is hoped that a special case may be placed in the hall of the exhibition floor for the exposition,

during short and stated periods, of interesting and timely groups of photographs. In this manner, in the course of a few years, most of the more important views in the collection could be made accessible to the public at a slight expense for casing. A catalogue cabinet was purchased and has been placed in the hall on the second floor of the Geological Museum for ready consultation.

State of Collection, July 1.	Photographs	Slides.	Negatives.
Accessions since last report	142	398	0
Unidentified views	253	0	0
Duplicates	144	0	0
Broken	0	6	0
Condemned	0	21	0
Condemned (as shown by catalogues) since beginning of collection . . .		57	
Last accession number	5954	5526	0
Number now in collection	5872	5469 ¹	1236
Number card catalogued	0	3987	0

The sub-committee on the Josiah Dwight Whitney Scholarship reports that two scholarships, of \$100.— each, were given to Mr. Sedgwick Smith and to Mr. G. B. Roorbach, students in the summer course in geology given in Montana; and that \$45.— was allotted to Mr. W. G. Reed, Jr., for geographic work in central France under the direction of Professor Johnson.

The following abstracts of the reports made to the Chairman by the Instructors in the Department give details as to the different courses, and set forth the condition of the laboratories.

Professor Jackson reports that Geology II was taken by three undergraduates and two graduates; Geology 15 was taken by one undergraduate and one graduate, and Geology 20*d* was taken by one graduate. The laboratory facilities for these courses are most complete, and it is to be regretted that so few students avail themselves of the advantages offered. During the year Professor Jackson has been engaged in work on a monograph on Palaeozoic Echini.

Professor Ward reports that the meetings in the course in Elementary Meteorology (Geology B) have been changed from 3.30 p. m. to 11 a. m., the result being a considerable increase in the

¹ The difference between actual number, and accession number is balanced by the number of slides condemned since beginning of collection.

number of students. A new course on the Geography of South America (Geology 2) was given for the first time. This course was established at the request of the Dean of the Graduate School of Business Administration. Geology I has been changed from the Climatology of the United States to the Climatology of North America. The intermediate course in meteorology has been given up, owing to the desire of the Department to develop its instruction along the lines of climatology, rather than in the direction of more detailed work in meteorology proper. The research course in Climatology (Geology 20e) was taken by four students. Theses prepared in this course have been published as follows: — "Early meteorological data for Saline, Mich.," by J. E. Buchanan, *Monthly weather review* (U. S. Department of Agriculture, Weather Bureau), April, 1908, vol. 26, p. 105-107. "Weather influences preceding the evacuation of Boston, Mass.," by W. N. Lacy, *ibid.*, May, 1908, p. 128-129. "Early meteorology at Harvard College," by B. M. Varney, *ibid.*, p. 140-142. "Some climatic influences in American history," by W. N. Lacy, *ibid.*, June, 1908, p. 169-173.

During the year the laboratory was inspected by Dr. P. Polis, Director of the Meteorological Observatory at Aachen, who had been sent to the United States by the Prussian Ministry of Agriculture to investigate the work of the United States Weather Bureau and the conditions of meteorological instruction in this country. In his report to his government, Dr. Polis laid special emphasis upon the equipment of this Department for giving instruction in meteorology and climatology.

Professor Ward spent six weeks of the summer in Brazil, as a member of the Shaler Memorial Expedition. His object was to gain information, at first hand, regarding the climate and products of southern Brazil. He has prepared several papers on the results of his trip.

Professor Woodworth reports that he gave courses 4, 5, 8, 16, and instruction in 20c, as in the previous year, in the first named course with the assistance of Professors Davis and Wolff as lecturers on special topics in general geology. Dr. Mansfield aided in the field work in courses 5 and 8. Gifts of rocks and maps for teaching purposes were received from Messrs. Eggleston, and Sayles, and Dr. Mansfield. A small collection of rocks illustrating

the geological formations of the vicinity of New York City has been added to the laboratory equipment in Course 5. Mr. Lahee, in connection with his work in Course 20c on the geology of the Kingston area in Rhode Island, made a collection of rocks from the metamorphosed coal measures of the Carboniferous system. Mr. H. E. Merwin, J. D. Whitney Scholar for 1906, deposited the fossil Pleistocene shells found by him in Vermont among the materials available for research. One graduate student worked during the year on the geographic conditions attending the extinction of *Mastodon americanus*; another carried on local field studies on the details of joint distribution in relation to directions of rock tension and compression.

The elementary courses offered to Radcliffe students show a falling off in attendance. The addition of laboratory and field work to the elementary lecture course on dynamical and structural geology given to these students in the Museum has been accompanied by a reduction in attendance from 34 young women in 1903 to 4 this year, and none this year elected the complementary course in historical geology in the second half-year. In the case of these courses young women are required to perform the same laboratory and field exercises as Harvard men, but their schedule of hours is necessarily unsatisfactory. They have the use of the laboratory when it is not needed for classes or sections of classes composed of Harvard students; so, too the choice of hours is restricted by the instructor and his assistants to their own free hours, thus giving rise to a greater number of conflicts in the choice of hours for the Radcliffe student than is the case with the student in Harvard University taking an equivalent course. The courses in geology taken by Radcliffe students are designed primarily as a part of a college course, and only occasionally does a student take the courses with the expectation of teaching elementary geology in the secondary schools, or as a foundation for teaching physiography. The Department sets aside no special room or collections for Radcliffe students in geology. It is understood that undergraduates of Harvard College and Radcliffe shall not work at the same time in the same room unless under special conditions, and then only when an instructor is present.

Professor Woodworth continued his work for the N. Y. Geological Survey during the year. In August and September, 1907,

he was engaged in mapping the Pleistocene formations of the Rouse's Point quadrangle in New York, and a part of that area lying in Vermont. A much greater share of his time than usual was given to routine work in the Museum, especially to the installation and working of the seismograph elsewhere referred to. On June 20th he sailed from New York for Rio de Janeiro in charge of the Shaler Memorial Expedition to South America.

Mr. Eggleston spent three weeks of September, 1907, in the examination of the syenite of Cuttingsville, Vt., and again visited the area in June, 1908. Early in the summer he joined Mr. Varney in a geological and geographical study of the coast of New Brunswick.

Mr. F. H. Lahee continued his studies of the southern part of the Narragansett basin in the summer of 1908.

Professor Johnson reports that the course in Economic Geography (Geology C), offered this year for the first time, was elected by 37 men. In the absence of Professor Davis he conducted the advanced course in Physiography (Geology 20a), in which three men pursued investigations in shoreline topography, drainage modifications, the place occupied by geography in the elementary schools, and the physiographic features of selected states in the Union. One report growing out of this work will be published in the near future.

During the winter Professor Johnson gave a course of fifteen lectures on Physical Geography in connection with the Teachers' School of Science, under the direction of the Lowell Institute. The lectures were attended by about 115 teachers from Boston and neighboring cities and towns. At a meeting of the geologists of the eastern United States held in New York City in April, Mr. W. G. Reed, Jr., a student in advanced physiography, presented a paper on the development of Nantasket Beach, and Professor Johnson a paper on the origin of beach cusps.

In June, Professor Johnson sailed for France, where he directed the researches of four students in the volcanic region of the Auvergne. The following topics were treated:—the physiographic features of the great fault-line scarp west of the Limagne basin, by Mr. S. W. Cushing; drainage modifications due to lava dams, by Mr. W. G. Reed, Jr.; physiographic features due to glacial erosion, by Mr. J. E. Buchanan; and variations in the forms of

volcanoes, by Mr. E. W. Schmitgen. After completing the studies in the Auvergne, Messrs. Cushing and Buchanan devoted a portion of the summer to studies of glacial erosion in Switzerland, northern Italy, and Scotland; while Mr. Reed investigated the physiographic features of the Maloja Pass region in Switzerland. Professor Johnson spent the remainder of the summer in physiographic studies in Switzerland, Northern Italy, western Germany, Scotland, and England. He attended the Ninth International Congress of Geography held at Geneva July 27–August 6.

The geographical laboratory equipment has been increased by the purchase of six new desks, a number of large wall maps and charts, ten eight-inch globes, besides a number of smaller maps, photographs, and lantern slides. Several large railroad maps of the United States were presented by the Boston representatives of different railroad companies.

Dr. Mansfield reports that he conducted Geology 12, Mining 28 and Geology S5, and rendered assistance in Geology 5 and 8. In course 12 during the first half-year the students made geological surveys of assigned areas and submitted reports in prescribed form. In the second half-year the time was spent in field-study of some of the broader geological problems afforded by the Boston Basin. In Mining 28 a study of a part of the Middlesex Fells district was made, on a scale of 300 feet to 1 inch. Each student was assigned a definite portion of the area, and the results were embodied in a single large map. Course S5 was conducted in Montana for five weeks in July and August. The party outfitted at Bozeman, Mont., and made a circuit of about 400 miles through the mountain district to the southwest and south, including the regions of Alder Gulch, Ruby River, Red Rock, and Henry's Lakes, and the Upper Madison Valley. Specimens and photographs were collected which will be available for the teaching collections of Course 5, and materials for brief publications were obtained. The course was taken by six students.

PUBLICATIONS. AUGUST 1, 1907–JULY 31, 1908.

D. W. JOHNSON.

[Review of Fairbank's] Practical physiography. *Science*, 7 February, 1908, new ser., vol. 27, p. 216–220.

A Harvard explorer in central Asia. *Harvard graduates' magazine*, March, 1908, vol. 16, p. 415-419.

Reviews in *Science*: Current notes on land forms.

D. W. JOHNSON and F. E. MATTHES.

The relation of geology to topography. Breed and Hosmer. Principles and practice of surveying. New York, 1908, vol. 2, p. 246-266.

G. R. MANSFIELD.

The characteristics of various types of conglomerates. *Journ. geol.*, September-October, 1907, vol. 15, p. 550-555.

Glaciation in the Crazy Mountains of Montana [Abstract]. *Science*, 13 March, 1908, new ser., vol. 27, p. 409-410.

The Baraboo region of Wisconsin. *Journ. geogr.*, 1908, vol. 6, p. 286-292.

Glacial and normal erosion in Montana and Wisconsin. *Journ. geogr.*, 1908, vol. 6, p. 306-312.

G. R. MANSFIELD and J. E. WOLFF.

The Harvard Summer School of Geology in Montana in 1907. *Harvard graduates' magazine*, December, 1907, vol. 16, p. 263-266.

R. DEC. WARD.

Zur klassifikation der klimate. *Meteorologische zeitschrift*, August, 1907, vol. 24, p. 361-362.

Climate and man. *Bull. Amer. geogr. soc.*, December, 1907, vol. 39, p. 735-738.

Some problems of the tropics. *Bull. Amer. geogr. soc.*, January, 1908, vol. 40, p. 7-11.

Kassner's meteorological globes. *Bull. Amer. geogr. soc.*, March, 1908, p. 148-150.

Climate, considered especially in relation to man. New York, G. P. Putnam's Sons, 1908. 8vo. 15, 372 pp., 34 figs.

Current notes on meteorology and climatology. *Science*, throughout the year.

Notes on climatology. *Bull. Amer. geogr. soc.*, throughout the year.

Reviews in *Science* and *Bull. Amer. geogr. soc.*

J. B. WOODWORTH.

Seismographic station. *Harvard bulletin*, 29, Apr. 1908, vol. 10, No. 29, p. 1.

[Shaler Memorial]. *Journ. econ. geol.*, June-July, 1908, vol. 3, p. 359-361.

REPORT ON THE MAMMALS.

BY OUTRAM BANGS.

The principal additions to the study series of mammals during the year, were collections made in China by Mr. W. R. Zappey and in Lower California by Mr. W. W. Brown, Jr., both presented by John E. Thayer, Esq., and in Java, Japan, Mollucas, and New Guinea by Mr. Thomas Barbour and given by him to the Museum. Twenty-three bats were purchased of Ward's Natural Science Establishment, and other specimens have been presented by Messrs. G. M. Allen, E. H. Austin, E. H. Baynes, H. B. Bigelow, W. L. Smith, R. M. Yerkes and Outram Bangs.

PUBLICATIONS. AUGUST 1, 1907-JULY 31, 1908.

JOHN E. THAYER AND OUTRAM BANGS.

Catalog of birds collected by W. W. Brown, Jr., in middle Lower California. *Condor*, Sept.-Oct., 1907, vol. 9, p. 135-140.

The present state of the Ornis of Guadaloupe Island. *Condor*, May-June, 1908, vol. 10, p. 101-106.

OUTRAM BANGS AND MORTON E. PECK.

On some rare and new birds from British Honduras. *Proc. biol. soc. Washington*, 29 February, 1908, vol. 21, p. 43-46.

OUTRAM BANGS.

Notes on the mammals of Block Island, Rhode Island. *Proc. N. E. zool. club*. 6 March, 1908, vol. 4, p. 19-21, pl. 1.

On certain Costa Rican birds. *Proc. N. E. zool. club*, 19 March, 1908, Vol. 4, p. 23-35.

A new name for the Texan barred owl. *Auk*, July, 1908, Vol. 25, p. 316.

Notes on birds from western Colombia. *Proc. biol. soc. Washington*, 27 July, 1908, vol. 21, p. 157-162.

A new tyrant-bird from the Santa Marta Region of Colombia. *Proc. biol. soc. Washington*, 27 July, 1908, vol. 21, p. 163-164.

REPORT ON THE BIRDS.

BY WILLIAM BREWSTER.

Only one bird, I believe, has been purchased by the Museum during the current year; this is a Passenger Pigeon, female, which was taken at Taylor, Wisconsin, in May, 1887. By exchange with the Brooklyn Institute we have secured a pair of Hoatzins (*Opisthocomus hoazin*) from Venezuela.

By gift the Museum has received the following birds:— From Mr. Thomas Barbour, one hundred and fifty skins from New Guinea, Dutch East Indies, and India; from Mr. George Nelson, one hundred and eleven skins most of which were obtained in New England; from Dr. C. W. Townsend, seven skins from Labrador and Newfoundland; from Mr. Samuel Henshaw an interesting Warbler killed in Hyde Park, Massachusetts, on June 13, 1907, and believed to be a hybrid between *Helminthophila pinus* and *H. leucobronchialis* (see Auk, 1907, vol. 24, p. 443-444, 446); from Col. John E. Thayer an albino Surf Scoter taken at Cohasset, Mass., on October 6, 1900. For other acceptable contributions the Museum is indebted to Miss Margaret Whyte, and to Messrs. Outram Bangs, J. H. Blake, G. H. Cox, C. B. Davenport, Walter Deane, C. E. Faxon, Walter Faxon, W. L. Holden, A. P. Morse, A. S. Pearse, F. W. Putnam, J. T. Reagan, G. H. Roulston and William Sullivan.

REPORTS ON THE REPTILES, BATRACHIANS, AND
FISHES.

BY SAMUEL GARMAN.

As heretofore growth in these departments has been steady, and as usual it has been effected by means of donations, exchanges, and purchases. The purchases have secured especially desirable specimens; the most important being a series of fishes prepared for exhibition by Mr. S. F. Denton. Among the best of the exchanges was one effected with Dr. N. Annandale; this consists of a series of Indian reptiles including a hundred and ten species, almost all of them desiderata. The donations range over numerous and widely separated localities and do not contain so many forms that are duplicates as might have been expected. They were contributed by the New York Zoölogical Society, Dr. W. T. Hornaday, Director, and by Messrs. Thomas Barbour, Henry B. Bigelow, F. C. Bowditch, C. A. Clark, H. L. Clark, F. T. Colby, W. W. Dodge, P. H. Goldsmith, R. H. Howe, Jr., E. L. Moseley, Wirt Robinson, O. H. Tellalian and John E. Thayer.

Collections sent in for determination were forwarded to the senders. Some of those sent out for study have been returned to the Museum.

A large series of Characinidae collected during the Thayer Brazilian Expedition have been sent to Prof. C. H. Eigenmann for study.

PUBLICATIONS. AUGUST 1, 1907–JULY 31, 1908.

New Plagiostomia and Chismopnea. *Bull. M. C. Z.*, February, 1908, vol. 51, p. 249–256.

Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N. commanding. XII. The Reptiles of Easter Island. *Bull. M. C. Z.*, June, 1908, vol. 52, p. 1–14, 1 pl.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

For acceptable gifts to the collection of the Department, the Museum has to thank Mrs. Elizabeth G. Peckham, Miss Elizabeth B. Bryant, Messrs. Outram Bangs, Thomas Barbour, Frederick Blanchard, Charles Bullard, Graham Carey, Henry R. Carey, Walter Deane, W. G. Farlow, Walter Faxon, James Fletcher, J. W. Folsom, R. M. Grey, J. G. Jack, C. W. Johnson, A. P. Morse, G. W. Peckham, Wirt Robinson, Roland Thaxter, P. R. Uhler, E. B. Williamson, and W. McM. Woodworth.

Through Mr. Thomas Barbour's generous enthusiasm, the Museum has some excellent representatives of Ornithoptera; of the twenty-six recognized species, eighteen are in the collection.

Other accessions include a large series of Central American insects, a part of those elaborated in the *Biologia Centrali Americana* of Godman and Salvin; a large collection of Odonata from Burmah and Siam and some desirable Coleoptera from Sardinia and from Guatemala.

Another collection of European myriopods has been purchased of Dr. Karl W. Verhoeff. There are 81 forms contained in this series, none of which were in the collection acquired last year. The Department has also received a number of interesting moths and butterflies, illustrative of protective resemblances, of true mimicry, and of Müllerian or convergent mimicry.

Portions of the collections, both fossil and recent, have been worked over. Of the fossils, some of the Jurassic forms have been studied, catalogued, and a series selected for exhibition; part of the S. H. Scudder collection of Tertiary Rhynchophora has been labeled, catalogued, and arranged. Mr. C. T. Brues has studied some of the phytophagous Hymenoptera from Florissant (see Bulletin M. C. Z., vol. 51, no. 10). Of recent forms, the ticks, and a large number of the spiders and of the myriopods have been rearranged.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

BY WALTER FAXON.

During the year a very valuable collection of European terrestrial isopods, consisting of 106 species and 336 specimens, was acquired by purchase from Dr. Karl W. Verhoeff.

Mr. Thomas Barbour has given two specimens of *Nautilus umbilicatus* from the Moluccas and two *Limulus rotundicauda* from Java.

Prof. E. L. Bouvier has returned another installment of the "Blake" Crustacea.

Miss Rathbun's report on the Brachyura obtained during the Eastern Tropical Pacific expedition by the "Albatross" has been published as the second number of the 35th volume of the Memoirs of the Museum.

Miss E. B. Bryant continued, for two months, her work on the land shells begun last year.

REPORT ON THE WORMS.

BY W. McM. WOODWORTH.

A small collection of earthworms from Java was received from Mr. T. Barbour, including a specimen of the giant *Perichaeta musica*.

To Mr. A. H. Clark we are indebted for some myzostomes from Japanese crinoids.

Material was lent to Prof. J. Percy Moore.

REPORTS ON THE LOWER INVERTEBRATES.

ECHINODERMS.

BY HUBERT LYMAN CLARK.

A large part of the year has been given to the labeling and cataloguing of the crinoids, Echini, and ophiurans, but much attention has been paid to the preparation of reports on special collections, particularly a very large collection of ophiurans made by the "Albatross" in the North Pacific Ocean. Exchanges have been effected with a number of museums and individuals, the most important of which were with the University of Washington, through Prof. Trevor Kincaid, a large and varied assortment of echinoderms from Puget Sound; the Zoölogical Museum, Amsterdam, through Dr. Max Weber, a very valuable lot of Echini, ophiurans, and holothurians, collected by the "Siboga"; the Zoölogical Museum, Strassburg, through Dr. Ludwig Döderlein, an interesting series of Echini, chiefly collected by himself in Japanese waters, also a few species collected by the "Valdivia"; the Royal Zoölogical Museum, Berlin, through Dr. Robert Hartmeyer, a very choice series of ophiurans, chiefly cotypes of Studer's species, including many collected by the "Gazelle."

Important additions to the collections have been made by purchase from A. Haylock, Alan Owston, and Ward's Natural Science Establishment. Mr. Thomas Barbour has generously donated a collection, containing 362 specimens, chiefly asteroids and ophiurans, made by himself in the Dutch East Indies. The Assistant has added about two hundred specimens, collected off Marblehead, Mass., and near South Harpswell, Maine.

The card-catalogue of crinoids has been completed; at the end of the year, there were 1,510 specimens, of which 1,330 are alcoholic, representing 28 genera and 110 species. This collection has been extensively studied by Mr. Austin Hobart Clark, and most of the identifications were made by him. An exchange with the U. S.

National Museum through Mr. Clark has added a number of his recently described species.

The collection of asteroids has increased during the year from 10,359 specimens of 93 genera and 387 species to 10,821 specimens of 95 genera and 404 species.

The card-catalogue of ophiurans has been begun and about 2,000 specimens, of some 25 genera entered.

The card-catalogue of Echini has been continued through two more families (Aspidodiadematidae, Diadematidae) and includes 5 families, 25 genera, 85 species and 2,591 specimens.

PUBLICATIONS. AUGUST 1, 1907—JULY 31, 1908.

ALEXANDER AGASSIZ and HUBERT LYMAN CLARK.

Preliminary report on the Echini collected in 1906, from May to December, among the Aleutian Islands, in Bering Sea, and along the coasts of Kamtchatka, Sakhalin, Korea, and Japan, by the U. S. Fish Commission Steamer "Albatross." *Bull. M. C. Z.*, October, 1907, vol. 51, p. 107-140.

HUBERT LYMAN CLARK.

As to Holothuria. *Science*, 25 October, 1907, new ser., vol. 26, p. 549-550.

The Cidaridae. *Bull. M. C. Z.*, December, 1907, vol. 51, p. 163-230, 11 pls.

The apodous holothurians. Washington, [January, 1908,] 1907, 231 pp., 13 pls.

A brittle-star new to the Woods Hole region. *Science*, 24 January, 1908, new ser., vol. 27, p. 147.

Some Japanese and East Indian echinoderms. *Bull. M. C. Z.*, April, 1908, vol. 51, p. 277-312.

Renewed interest in recent crinoids. *Amer. nat.*, May, 1908, vol. 42, p. 350-355.

The type of Cidaris. *Ann. mag. nat. hist.*, June, 1908, ser. 8, vol. 1, p. 532-533.

ACALEPHS.

BY HENRY B. BIGELOW.

The more important accessions received during the year have been a series of medium sized specimens of *Dactylometra quinquecirra* from Mr. Thomas Barbour, and several living specimens of *Haliclystus auricula* from Mr. Owen Bryant. Specimens of *Tima formosa* and *Aurelia flavidula* have been purchased, and the latter, as well as an example of *Dactylometra lactea* from Cuba have been prepared for exhibition in the Synoptic room. Through the courtesy of Mr. R. Rathbun the entire collection of Pacific Medusae and siphonophores in the U. S. National Museum has been loaned for study.

The greater part of the year has been occupied in completing the report on the Medusae collected by the "Albatross" in the eastern Pacific in 1904-1905. Considerable time has been given to re-identifying and relabeling the collection. As much of the material has never been identified, this work has progressed slowly. The siphonophores of the 1891 "Albatross" expedition, returned by Dr. Chun, have been identified. Several jars of unassorted Plankton from Woods Hole, Mass., presented two years ago by Dr. G. H. Parker, have been sorted, and many acceptable siphonophores and Medusae obtained from them.

During the first half of July, through the courtesy of Mr. G. M. Bowers, Chief of the U. S. bureau of fisheries, I visited the Gulf stream south of Martha's Vineyard in charge of the U. S. F. C. schooner "Grampus." The main objects of the expedition were to study the intermediate fauna, and to test the deep sea trap devised by the Prince of Monaco, employed for the first time on this side of the Atlantic. On our return around Cape Cod we were able to compare the surface fauna of the cold current with that of the warm waters of the Gulf stream, finding the usual characteristic differences. Owing to favorable weather we made frequent hauls with the open nets at the surface, and at various depths down to 300 fathoms, and likewise employed the Tanner closing net at depths down to 200 fathoms. Temperatures were taken at various depths with the deep sea thermometers, and a num-

ber of soundings made. The Monaco trap proved successful down to 450 fathoms, the greatest depth at which it was tested, and it brought back numerous fishes on each occasion that it was set. Considerable collections of the surface fauna were made, Salpa and Doliolum, in particular, being remarkably abundant, but very few species from intermediate depths were taken. Especially noteworthy among the collections are a series of excellent specimens of a Medusa belonging to the Bythotiaridae, a family but little known.

PUBLICATIONS. AUGUST 1, 1907-JULY 31, 1908.

Studies on the nuclear cycle of *Gonionemus murbachii* A. G. Mayer.

Bull. M. C. Z., December, 1907, vol. 48; p. 285-399, 8 pls.

On hybrids between the mallard (*Anas boschas*) and certain other ducks. *Auk*, October, 1907, vol. 24, p. 382-388.

REPORT ON THE DEPARTMENT OF VERTEBRATE PALAEONTOLOGY.

BY CHARLES R. EASTMAN.

Departmental work has been conducted during the year along essentially the same lines as indicated in the last Report, chief attention having been directed to a systematic review of the Devonian fishes of the Ohioan and Dakotan provinces. Several of the older collections belonging to this Museum, notably those brought together by Mr. Orestes H. St. John and Prof. Samuel Calvin from the Mesodevonian and Neodevonian of Iowa, yielded very interesting results. Valuable aid was also derived from a quantity of material obtained a number of years ago by the late Prof. O. C. Marsh, for the loan of which the Museum is indebted to the courtesy of Prof. Charles Schuchert.

Incidental to the selection of fossil fish material at Yale University, copies of two unpublished lithographic plates, signed by Sonrel, were discovered, and were recognized as having been designed to illustrate Dr. C. T. Jackson's descriptions of Carboniferous fishes from the Albert Coal Mine of New Brunswick. The plates were still in the hands of the engraver at the time Jackson's Report was published, in 1851, and appear never to have been distributed. By means of these two copies, or, it may be, proofs, it became possible to identify a number of the original types and figured specimens in the collection of this Museum and in that of the Boston Society of Natural History. A re-investigation of Jackson's material and other remains from the same locality has since been undertaken. A report on the fish-fauna from the Waverly of central Kentucky is nearly ready for publication.

Following is a list of the accessions and publications during the current year.

ADDITIONS.

An excellent example of *Dipterus valenciennesi* Ag. from the Lower Old Red Sandstone of Caithness, collected by Wm. Kinnear. Purchased.

Gutta-purcha replica of "*Pholidosteus friedeli*" Jaekel (*Brachydirus bidorsatus* von Koenen), from the Lower Devonian of Wildungen, Waldeck. Presented by Dr. Otto Jaekel.

Casts of mylostomid dental plates, etc. From Prof. Bashford Dean.

A small lot of Devonian fish-remains from Missouri. From D. K. Greger.

A few specimens of Palaeozoic sharks' teeth and similar material from the Waverly near Meadville, Penn. Presented by Mr. Wm. Millward.

PUBLICATIONS. AUGUST 1, 1907—JULY 31, 1908.

Notice of a new coelacanth fish from the Iowa Kinderhook. *Journ. geol.*, May-June, 1908, vol. 16, p. 357-362.

Dates of early Santorin and Ischian eruptions. *Science*, 29 May, 1908, new ser., vol. 27, p. 855.

[Review of] Dr. J. M. Clarke's Early Devonian history of New York and eastern North America. *Amer. journ. sci.*, July, 1908, ser. 4, vol. 26, p. 93-95.

REPORT ON THE GEOLOGICAL COLLECTION.

BY ROBERT W. SAYLES.

The subcommittee on the Geological Museum (Professors Woodworth, Wolff, and Jackson) act as advisers to the Assistant; the expenditure of the funds are determined by the Department of Geology and Geography.

One third of the income of the R. W. Sayles Fund (\$5000.—) has been used for the purchase of specimens and two thirds for shelves, brackets, and appliances.

A series of photographs illustrating the eruption of Mt. Pelée, purchased with the consent of the Committee on the Gardner Collection, has been hung near the specimens from St. Pierre.

The following additions are gratefully acknowledged:—from Mr. C. R. Simpkins, an instructive series of lavas from Hawaii; from Mr. A. W. Rogers, a collection of glacial pebbles from the supposed Archean conglomerates of Griqualand; from Prof. Charles White, a collection of calcareous growths from the shore of the Pleistocene Lake Lahontan, near Hazen, Nevada; from Prof. R. T. Jackson twenty specimens of fossils; from Prof. Charles Palache, a modern travertine deposit made in a mine flume.

The Assistant has given a large glacial erratic deeply eaten by swamp waters, one of the so-called Anvil rocks from Providence, R. I., and also a fragment of Stockbridge limestone, from the bed of the Housatonic river at South Lee, Mass., showing a good river-made pot hole.

A catalogue has been begun and 350 specimens have been entered.

Two models, one of the Gulf of Mexico and the second of Mt. Ktaadn, have been placed on exhibition; the former was received some years ago from the U. S. Coast and Geodetic Survey, the latter was made in 1881 by Mr. C. E. Hamlin (see Bulletin M. C. Z., 1881, vol. 7, no. 5).

Printed labels for all the specimens in the case devoted to syn-

optic geology have been prepared; these labels give a brief description of the specimens with references to more detailed notices. The first reference, of a general nature, is usually to Geikie's Text book of geology, the second to a more comprehensive account. The other cases have more or less complete exhibits showing the organic phase of structural and dynamical geology; volcanic action or vulcanism; the effects of water in motion; and glacial geology.

When possible, photographs from the Gardner Collection, have been added to illustrate the specimens shown. There are now 176 photographs on exhibition.

It is hoped that the former students and friends of the Department of Geology and Geography will aid in acquiring collections illustrative of structural and dynamical geology and of the physiographic features of the earth's surface, and in the adequate equipment of this section of the University Museum.

REPORT ON THE LIBRARY.

During the year from August 1, 1907, to July 31, 1908, inclusive, 1,040 volumes, 2,128 parts of volumes, and 2,240 pamphlets have been added to the Library.

The total number of volumes in the Library is 44,558, the total number of pamphlets is 40,266.

Six hundred and eight volumes have been bound; seven hundred and four pamphlets have been separately bound.

[A]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE YEAR 1907-1908.

Bulletin:—

Vol. XLVIII.

- No. 4. Studies on the nuclear cycle of *Gonionemus murbachii* A. G. Mayer. By Henry B. Bigelow. pp. 116. 8 Plates. December, 1907.

Vol. XLIX. (Geological Series, Vol. VIII.)

- No. 5. An occurrence of Harney granite in the northern Black Hills. By Henry G. Ferguson and Fremont N. Turgeon. pp. 10. 3 Plates. February, 1908.

- No. 6. Experiments illustrating erosion and sedimentation. By Thomas Augustus Jaggar, Jr. pp. 24. 6 Plates. March, 1908.

- No. 7. Some late Wisconsin and Post-Wisconsin shore-lines of north-western Vermont. By Herbert E. Merwin. pp. 24. 3 Plates. June, 1908.

Vol. LI.

- No. 5. Preliminary report on the Echini collected in 1906, from May to December, among the Aleutian Islands, in Bering Sea, and along the coasts of Kamtchatka, Sakhalin, Korea, and Japan, by the U. S. Fish Commission Steamer "Albatross," in charge of Lieut. Commander L. M. Garrett, U. S. N., commanding. By Alexander Agassiz and Hubert Lyman Clark. pp. 34. October, 1907.

- No. 6. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. XI. Die Xenophyophoren. Von Franz Eilhard Schulze. pp. 22. 1 Plate. November, 1907.

- No. 7. The Cidaridae. By Hubert Lyman Clark. pp. 68. 11 Plates. December, 1907.

- No. 8. Notice of some crinoids in the collection of the Museum of Comparative Zoölogy. By Austin Hobart Clark. pp. 18. 2 Plates. January, 1908.

- No. 9. New Plagiostomia and Chismopnea. By Samuel Garman. pp. 8. February, 1908.
- No. 10. New phytophagous Hymenoptera from the Tertiary of Florissant, Colorado. By Charles T. Brues. pp. 20. March, 1908.
- No. 11. Some Japanese and East Indian echinoderms. By Hubert Lyman Clark. pp. 36. April, 1908.
- No. 12. Some new reptiles and amphibians. By Thomas Barbour. pp. 14. April, 1908.
- Vol. LII.
- No. 1. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. XII. The reptiles of Easter Island. By Samuel Garman. pp. 14. 1 Plate. June, 1908.
- No. 2. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. XIII. The characters of Atelaxia, a new suborder of fishes. By Edwin Chapin Starks. pp. 8. 5 Plates. July, 1908.
- No. 3. Notes on Chiroptera. By Glover M. Allen. pp. 40. 1 Plate. July, 1908.

Memoirs:—

Vol. XXVI.

- No. 6. Reports on the Scientific Results of the Expedition to the Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding. X. The lantern fishes. By Charles Henry Gilbert. pp. 24. 6 Plates. July, 1908.

Vol. XXXV.

- No. 2. Reports on the Scientific Results of the Expedition to the Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding. IX. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut.-Commander L. M. Garrett, U. S. N., Commanding. X. The Brachyura. By Mary J. Rathbun. pp. 54. 9 Plates. August, 1907.

Report:—

- 1906-1907. pp. 44. 3 Plates. January, 1908.

[B]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE.

Sturgis-Hooper Fund	\$108,087.41
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Virginia Barret Gibbs Fund	5,841.28
Willard Peele Hunnewell Memorial Fund	5,000.00
Maria Whitney Fund	5,000.00

\$604,665.80

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Curator. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray, the Humboldt, and the Maria Whitney Funds, are annually charged in an analysis of the accounts, with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund (about \$300) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Woods Hole, the Stations at Bermuda, or the Tortugas.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250., is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

The income of the Maria Whitney Fund can be applied for the care (binding) and increase of the Whitney Library.

Applications for the tables reserved for advanced students at the Woods Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

The following Publications of the Museum of Comparative Zoölogy
are in preparation : —

LOUIS CABOT. Immature State of the Odonata, Part IV.

E. L. MARK. Studies on Lepidosteus, continued.

“ On Arachnactis.

AGASSIZ and WHITMAN. Pelagic Fishes. Part II., with 14 Plates.

A. AGASSIZ and H. L. CLARK. The “Albatross” Hawaiian Echini.

S. GARMAN. The Plagiostomes.

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge
of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer “Blake,” as follows: —

C. HARTLAUB. The Comatulæ of the “Blake,” with 15 Plates.

H. LUDWIG. The Genus Pentacrinus.

A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the “Blake.”

A. E. VERRILL. The Alcyonaria of the “Blake.”

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer
“Albatross,” Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in
charge of ALEXANDER AGASSIZ, as follows: —

A. AGASSIZ. The Pelagic Fauna.

HAROLD HEATH. Solenogaster.

“ The Panamic Deep-Sea Fauna. W. A. HERDMAN. The Ascidians.

H. B. BIGELOW. The Siphonophores.

S. J. HICKSON. The Antipathids.

K. BRANDT. The Sagittæ.

E. L. MARK. Branchiocerianthus.

“ The Thalassicolæ.

JOHN MURRAY. The Bottom Specimens.

O. CARLGREN. The Actinarians.

P. SCHIEMENZ. The Pteropods and Hete-
ropods.

W. R. COE. The Nemerteans.

REINHARD DOHRN. The Eyes of Deep-
Sea Crustacea. THEO. STUDER. The Alcyonarians.

— The Salpidae and Doliolidae.

H. J. HANSEN. The Cirripeds.

H. B. WARD. The Sipunculids.

“ The Schizopods.

W. McM. WOODWORTH. The Annelids.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of
ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer “Albatross,” from
August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding,
as follows: —

A. AGASSIZ. The Echini.

JOHN MURRAY. The Bottom Specimens.

F. E. BEDDARD. The Earthworms.

MARY J. RATHBUN. The Crustacea
Decapoda.

H. L. CLARK. The Holothurians.

RICHARD RATHBUN. The Hydrocoral-
lidae.

— The Volcanic Rocks.

— The Coralliferous Limestones.

G. O. SARS. The Copepods.

L. STEJNEGER. The Reptiles.

J. M. FLINT. The Foraminifera and Radi-
olaria. C. H. TOWNSEND. The Mammals, Birds,
and Fishes.

S. HENSHAW and A. G. MAYER. The
Insects. T. W. VAUGHAN. The Corals, Recent
and Fossil.

R. LENDENFELD and F. URBAN. The
Siliceous Sponges. W. McM. WOODWORTH. The Annelids.

W. McM. WOODWORTH. The Annelids.

H. LUDWIG. The Starfishes and Ophiurans.

G. W. MÜLLER. The Ostracods.

PUBLICATIONS
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to LI.; of the MEMOIRS, Vols. I. to XXIV., and also Vols. XXVIII., XXIX., XXXI. to XXXIII.

Vols. LII. and LIII. of the BULLETIN, and Vols. XXV., XXVI., XXVII., XXX., XXXIV., XXXV., XXXVI., XXXVII., and XXXVIII. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Professors and Assistants of the Museum, of investigations carried on by students and others in the different Laboratories of Natural History, and of work by specialists based upon the Museum Collections and Explorations.

The following publications are in preparation:—

Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., Commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., Commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

Reports on the Scientific Results of the Expedition to the Eastern Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from October, 1904, to April, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding.

Contributions from the Zoölogical Laboratory, Professor E. L. Mark, Director.
Contributions from the Geological Laboratory.

These publications are issued in numbers at irregular intervals; one volume of the Bulletin (8vo) and half a volume of the Memoirs (4to) usually appear annually. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent on application to the Librarian of the Museum of Comparative Zoölogy, Cambridge, Mass.

